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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/550,805	07/12/2006	Tominaga Koji	FUJ-0001	3990

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EXAMINER	
LUKE, DANIEL M	
ART UNIT	**PAPER NUMBER**
2813	

NOTIFICATION DATE	DELIVERY MODE
06/11/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/550,805	KOJI ET AL.	
	Examiner	Art Unit	
	DANIEL LUKE	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 March 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the request for reconsideration filed 3/17/2009.

Currently, claims 1-12 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 8, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conley et al. (US 2004/0203254).

Pertaining to claim 1, Conley shows a method, comprising: forming an insulating film in a semiconductor device ([0002]), wherein the insulating film has a thickness in the range of less than two monolayers to 5 nm ([0059]; this number is taken as the overall thickness of the two insulating layers); and removing impurities from the insulating film ([0052], lines 6-14), wherein the removing impurities is performed at a temperature greater than 500°C ([0052], lines 10-14), to form an insulating film having a prescribed thickness ([0053], lines 1-3).

Pertaining to claim 8, Conley shows a method, comprising: forming an insulating film in a semiconductor device ([0002]), wherein the insulating film has a thickness in the range of less than two monolayers to 5 nm ([0059]; this number is taken as the overall thickness of the two insulating layers); and removing impurities from the insulating film to form an insulating film having a prescribed thickness ([0052], lines 6-14).

Pertaining to claims 10 and 11, Conley shows the steps of forming an insulating film and removing impurities from the insulating film are performed sequentially a plurality of times until a prescribed thickness is achieved ([0053], lines 1-3).

Although Conley does not show the specific insulating film thickness range as claimed in claims 1 and 8, the court has held that "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003).

Claims 2-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conley in view of Colombo et al. (US 2005/0136690).

Conley teaches the method of claim 1.

Pertaining to claim 9, Conley shows a method, comprising: forming an insulating film in a semiconductor device ([0002]), wherein the insulating film has a thickness in the range of less than two monolayers to 5 nm ([0059]; this number is taken as the overall thickness of the two insulating layers); and removing impurities from the insulating film ([0052], lines 6-14) to form an insulating film having a prescribed thickness ([0053], lines 1-3).

Pertaining to claim 12, Conley shows the steps of forming an insulating film and removing impurities from the insulating film are performed sequentially a plurality of times until a prescribed thickness is achieved ([0053], lines 1-3).

Conley fails to show, pertaining to claim 2, removing impurities is performed in a reducing gas atmosphere; and, pertaining to claims 3 and 9, removing impurities comprises a first treatment in a reducing gas atmosphere and a second treatment in an oxidizing gas

atmosphere. Pertaining to claims 4-7, Conley fails to show the possible gases that make up the reducing and oxidizing gas atmospheres.

However, Colombo teaches in [0013] – [0014] that a high-k dielectric film is subjected to two anneals, both at temperatures in the range of 500°C to 1100°C. The first anneal is performed in a reducing gas atmosphere ([0013], lines 1-4). The reducing gas atmosphere may comprise, for example, hydrogen ([0013], lines 7-8). The second anneal is performed in an oxidizing gas atmosphere ([0014], lines 1-4). The oxidizing gas atmosphere may comprise, for example, oxygen. These anneals act to remove impurities from the dielectric film ([0011]).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to perform the step of removing impurities in the method of Conley by a two-step anneal process in which the first anneal is performed in a reducing gas atmosphere and the second anneal is performed in an oxidizing gas atmosphere, as taught by Colombo. The motivation to do so is that the anneal process taught by Colombo reduces point defects and impurities in the dielectric film ([0005]).

Although Conley does not show the specific insulating film thickness range as claimed in claims 1 and 8, the court has held that "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003).

Response to Arguments

Applicant's arguments filed 3/17/2009 have been fully considered but they are not persuasive.

Applicant rebuts the prima facie case of obviousness established by the examiner by arguing the following:

"As explained in detail on pages 6-8 of the present specification, impurities cannot be reliably removed from a film when the thickness exceeds 2.0 nm (see also present Figures 2(A)-4(B)). In other words, in the method of Conley, which includes thicknesses greater than 2.0 nm, impurities may not be reliably removed. In other words, limiting the thickness of the insulating film to the specifically claimed ranges of claims 1 and 8 results in better removal of impurities than in conventional methods. These results are novel and unexpected because, as described on pages 1-2 of the present specification, conventional methods of removing impurities result in undesirable formation of an interface layer. Thus, this illustrates the "criticality" of the specifically claimed ranges of claims 1 and 8. Therefore, because the specifically claimed ranges of claims 1 and 8 are "critical" a prima facie case of obviousness based on overlapping ranges is rebutted as indicated in MPEP 2144.05.III."

Firstly, it should be noted that, in rebutting a prima facie case of obviousness, comparisons are to be made with the closest prior art. In re Burckel, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979). Therefore, the argument that "[t]hese results are novel and unexpected because, as described on pages 1-2 of the present specification, conventional methods of removing impurities result in undesirable formation of an interface layer" is not a proper rebuttal, since it compares the claimed invention to "conventional methods" as they are described in the specification, rather than the cited Conley reference.

Further, as illustrated in FIG. 2(A) and 4(A), the "removing impurities" step has a clear trend as it relates to film thickness. That is, the amount of gas (FIG. 2(A)) and the relative intensity (FIG. 4(A)) decrease as film thickness decreases. Therefore, using the claimed range of

0.3 to 2 nm appears to be routine optimization of the range disclosed by Conley. The results of using the claimed range, as shown in FIG. 2(A) and 4(A), produces expected results.

Lastly, it should be noted that any evidence relied upon must be in the form of an affidavit or declaration (see MPEP 716.02(g)). "The reason for requiring evidence in declaration or affidavit form is to obtain the assurances that any statements or representations made are correct, as provided by 35 U.S.C. 25 and 18 U.S.C. 1001."

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL LUKE whose telephone number is (571)270-1569. The examiner can normally be reached on Monday through Friday 8:30 a.m. to 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Landau can be reached on (571) 272-1731. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. L./
Examiner, Art Unit 2813
5/26/2009

/Matthew C. Landau/
Supervisory Patent Examiner, Art Unit 2813